

U.S. Patent Application Serial No. 10/087,913
PRELIMINARY AMENDMENT
TO RCE filed September 16, 2004

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in this application:

Listing of Claims:

Claims 1 - 9 (Canceled)

Claim 10 (Withdrawn): An electronic device comprising a conductive composition layer having:

a region of a metal or alloy having a melting point of 230°C or higher,

a region of an alloy having a melting point lower than 230°C; and

a region comprising a thermoset resin and/or thermoplastic resin,

wherein at least one portion of the upper surface and one portion of the lower surface of said conductive composition layer are linked to each other by a region of said alloy having a melting point lower than 230°C.

Claim 11 (Withdrawn): An electronic device according to claim 10, wherein:

said region of said metal or alloy having a melting point of 230°C or higher is composed of at least any one material selected from the group consisting of Sn, Bi, and Pb; and

said region of said alloy having a melting point lower than 230°C is composed of an alloy resulting from combination of at least any two materials selected from the group consisting of Sn,

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Bi, In, and Pb.

Claim 12 (Withdrawn): An electronic device having conductive composition layer obtained by heat-treating, at a temperature below 230°C, a conductive composition comprising:

said conductive particles described in claim 1; and

a thermosetting resin having a curing temperature lower than 230°C and/or a thermoplastic resin having a melting point lower than 230°C.

Claim 13 (Withdrawn): An electronic device according to any one of claims 10 to 12, wherein said thermosetting resin having a curing temperature lower than 230°C and/or said thermoplastic resin having a melting point lower than 230°C, or, alternatively, said thermoset resin and/or thermoplastic resin, is at least one resin selected from the group consisting of epoxy-based, phenolic-based and acrylic-based thermosetting resins or thermoset resins thereof, and polyethylene type, polyester type, polypropylene type and acrylic type thermoplastic resins.

Claim 14 (Withdrawn): An electronic device having a conductive composition layer described in claim 10 between at least one combination of a semiconductor device and a cooling member, a semiconductor device and a substrate, and a lead terminal and a substrate.

Claim 15 (Withdrawn): An electronic device manufacturing method comprising:

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subjecting to bonding a conductive composition comprising conductive particles as described in any one of claims 1 to 6, and a thermosetting resin having a curing temperature lower than 230°C and/or a thermoplastic resin having a melting point lower than 230°C; and

performing a heat treatment on said composition, wherein provision is made so that a layer made of said composition exhibits conductivity when said heat treatment is finished.

Claim 16 (Withdrawn): An electronic device manufacturing method according to claim 15, wherein said heat treatment is performed at a temperature below 230°C.

Claim 17 (Withdrawn): An electronic device manufacturing method according to claim 15, wherein said thermosetting resin having a curing temperature lower than 230°C and/or said thermoplastic resin having a melting point lower than 230°C is at least one resin selected from the group consisting of epoxy-based, phenolic-based, and acrylic-based thermosetting resins, and polyethylene type, polyester type, polypropylene type and acrylic type thermoplastic resins.

Claim 18 (Canceled)

Claim 19 (Canceled)

Claim 20 (Canceled)

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Claim 21 (Currently Amended): Conductive particles consisting essentially of:
a base material consisting of a metal ~~that is a simple substance~~ in element form selected from
the group consisting of: Sn, In, Bi, and Pb; and
a coating material comprising one or more members selected from the group consisting of
Sn, In, Bi, Pb and alloys thereof;
wherein said coating material is provided on said base material such that said coating
material and said base material are in mutual contact.

Claim 22 (Currently Amended): The conductive particles of ~~any one of claims 18, 19, 20~~
~~or claim 21~~, wherein said base material and said coating material are capable of producing an alloy
having a melting point lower than 230°C by being heated at a temperature lower than 230°C.

Claim 23 (Currently Amended): The conductive particles of ~~any one of claims 18, 19, 20~~
~~or claim 21~~, wherein said coating material has a film thickness corresponding to 5% or greater of the
average particle size of the base material.

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Claim 24 (Previously Presented): The conductive particles of claim 23, wherein said coating material has a film thickness corresponding to 5% to 15% of the average particle size of the base material.

Claim 25 (Currently Amended): The conductive particles of ~~any one of claims 18, 19, 20~~ or claim 21, wherein said coating material has a film thickness of from 0.5 μm to 4.0 μm .

Claim 26 (Previously Presented): The conductive particles of claim 25, wherein said coating material has a film thickness of from 2.0 μm to 4.0 μm .

Claim 27 (Currently Amended): A conductive composition, comprising:
~~conductive particles comprising at least two materials selected from the group consisting of Sn, Bi, In, Pb, and alloys thereof, said at least any two materials being in mutual contact; and~~
conductive particles consisting of a base material and a coating material, respectively,
said coating material being provided on said base material such that said coating material and
said base material are in mutual contact,
said base material comprising one or more members selected from the group consisting of
Sn, Bi, In, Pb, and alloys thereof, and
said coating material comprising one or more members selected from the group consisting
of Sn, Bi, In, Pb, and alloys thereof; and

a resin composition comprising one or more members selected from the group consisting of a thermosetting resin having a curing temperature lower than 230°C and a thermoplastic resin having a melting point lower than 230°C, wherein the resin composition cures and/or solidifies after a heating treatment at a temperature lower than 230°C to act as an adhesive material.

Claim 28 (Previously Presented): The conductive composition of claim 27, wherein said resin composition comprises at least one member selected from the group consisting of: epoxy-based thermosetting resins, phenolic-based thermosetting resins, acrylic-based thermosetting resins, polyethylene type thermoplastic resins, polyester type thermoplastic resins, polypropylene type thermoplastic resins, and acrylic type thermoplastic resins.

Claim 29 (Previously Presented): The conductive composition of claim 27, wherein said curing temperature and/or said melting point, are in the range of from 100°C to 200°C.

Claim 30 (Previously Presented): The conductive composition of claim 27, wherein said resin composition comprises 10 to 100 parts by weight based on 100 parts by weight of said conductive particles.

Claim 31 (Previously Presented): The conductive composition of claim 30, wherein said resin composition comprises 10 to 40 parts by weight based on 100 parts by weight of said

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conductive particles.

Claim 32 (Previously Presented): The conductive composition of claim 27, wherein said at least two materials comprise at least one base material and at least one coating material, where said coating material is provided on said base material to form a coating.

Claim 33 (Previously Presented): The conductive composition of claim 32, wherein said coating material has a film thickness corresponding to 5% or greater of the average particle size of the base material.

Claim 34 (Previously Presented): The conductive composition of claim 32, wherein said coating material has a film thickness of from 0.5 μm to 4.0 μm .